

in the process. Shearing does not necessarily involve flattening, though in a large number of cases the two would doubtless go together. For this reason it is not correct to speak of cleavage as due to "shearing" (p. 255): shearing alone will not produce all the phenomena of cleavage; there must be flattening of the particles as well. Under the head of "Joints," instead of vaguely stating that some joints may be due to compression or torsion, would it not have been better to introduce a few lines about Daubrée's experiments, which almost bring a conviction that the majority of joints in sub-aqueous rocks are due to torsional strain?

In Part III., to which some of the above criticisms apply, we have a clear account of the way in which the crust of the earth is built up out of the materials described in Part II. Then follows Part IV., "The Geological Record of the History of the Earth." This must necessarily be presented in an abridged form, and if any fault is to be found with the way in which the subject is handled, it might perhaps be said that an attempt has been made to be rather too encyclopædic. Graphic pictures, such as the author can so well pen, of the physical geography of our own country, and, where necessary, of the adjoining parts of Europe, during the different geological periods, would perhaps have been more acceptable and instructive to most of those who will read this book than palæontological details and accounts of the range of formations through other lands. For instance, the sketch of the physical geography of Europe during the Triassic period on p. 380, strikes us as singularly happy, and we should like to have seen more of the same kind of thing in the book. We all know how the pigeon-hole geologist deals with this question; how he produces his parallel ruler and divides his sheet of paper nearly into squares; how he puts the names of countries into the squares on the top line and the names of formations into the squares down one side, and then proceeds to fill in his puzzle. Under the column "England," line "Muschelkalk," he inserts "Wanting." Ha! says he, a whole formation missing! great unrepresented interval! there must be a corresponding unconformity. Primed with this idea he now takes to the field, finds that the evenly-bedded New Red Marl does lie irregularly on the false-bedded sand-banks of the New Red Sandstone, and is overjoyed to see the unconformity which his chess-board told him must be there. Had he used, in trying to realise the meaning of the geological facts, half the ingenuity he showed in distorting them in order to fit them on to his Procrustean bed, he would have seen that what is called the Muschelkalk is not the only marine intercalation in the Trias of Central Europe, but that minor muschelkalks occur both in the Keuper and Bunter; that each of these marks an advance of the Triassic sea over the district where they are found; and that the reason why neither the great nor the little muschelkalks are found in England is that the sea did not succeed in pushing its way as far west as our country during any of its incursions. But there is no pigeon-holing in the book before us, and where the author has tried to bring before us a picture of the physical geography of bygone time, he has been so successful that we wish he had given us more of them.

A. H. G.

OSCAR SCHMIDT'S "MAMMALIA"

The Mammalia in their Relation to Primæval Times.

By Oscar Schmidt. International Scientific Series. (London: Kegan Paul, Trench, and Co., 1885).

THE numerous and important discoveries that have been made in the last few years in extinct forms of mammalian life, and the light that has been thus thrown upon the relations of the surviving species, render a popular summary of our present knowledge of the class a very desirable undertaking. Moreover any work which, by showing the intimate relation of the present with the past, aids in breaking down the custom, which has descended to us from an antiquated condition of scientific culture, of treating separately of the existing and the extinct forms of life, of speaking of zoology and palæontology as if they were distinct subjects, must be welcomed by the philosophical naturalist.

In undertaking such a work the late Prof. Oscar Schmidt, of Strasburg (whose death we regret to say has been recently announced), acknowledges that he was departing from the specialty in which he had so highly distinguished himself, and was deriving his materials entirely from the researches of others. But the subject evidently had strong attractions for him, and he has most industriously and impartially compiled from the best authorities a work which, if it had been written in any one of the languages of the series of which it forms a part would have well served the purpose intended. The attempt, however, to give it a truly "international" character, by bringing it out in a combination of two languages, is unfortunately anything but successful. Words are continually occurring, which, though perhaps literal translations of German pseudo-vernacular expressions of modern manufacture, can convey no meaning to the English reader, whatever assistance he may get from the dictionary, as for instance, "spoon-dog" (for the African large-eared fox, *Otocyonalandii*), "fingered-animal" (for Chiromys), "forked-animals" (for the Monotremata), "dog-fish" (for seal); and such expressions as "mid-jawbone," "root of the hand," "middle hand," "skiff-bone," and "spoke" are far less intelligible to the student of ordinary education than their generally-accepted scientific equivalents "premaxilla," "carpus," "metacarpus," "navicular," and "radius." Misprints and inaccuracies abound everywhere, such as the habitat of the small species of hippopotamus being transferred from Liberia to Siberia, the reference to "African armadillos" and to Prof. Huxley's discovery of fibrous epipubic structures "in several hundred different species of dogs"! As a specimen of style we may quote the following sentence:—"When it is said that the Marsupials 'vicariate' in Australia for the other groups distributed on the other continents, this expression denotes nothing but the bare fact, nothing but the mere statement, that in America we do not meet with the camel but with the llama, which in a few main characteristics shows some affinity with it" (p. 13). With the general argument against the idea that the expression "vicarious," or, as English authors generally say, "representative," species offers no explanation of the facts of distribution we entirely agree, and we can even see what was floating through the author's mind when this extraordinary sen-

tence was penned. The following description of the horn of the rhinoceros is however quite beyond our comprehension:—"The head weapons are solid horny projections of the nasal bone, which rise into a flat hump within equalities of the bone substance. From this characteristic feature it can in most cases be determined whether the fossil animals of the rhinoceros species possessed horns" (p. 194).

There is so much solid and useful information in the work, brought down to the most recently-published researches, as, for instance, those of Nehring, Branco, and Piétrement on extinct horses, that, if it had been subjected to careful revision by any one conversant both with the subject and the English language, it would have made a popular and readable manual of great educational value.

W. H. F.

OUR BOOK SHELF

Chemistry of the Non-Metals. By E. B. Aveling, D.Sc. (London: Joseph Hughes, 1886.)

DR. AVELING tells us in the preface that "few people have as hearty a dislike for the whole system of examinations as himself. Theoretically, the object of the acquisition of knowledge is the bettering of human conditions. Practically, to-day the end and sole object is the passing of some examination"; after which the subject is shelved indefinitely in perhaps most cases. This seems to be the author's opinion, and it is doubtless correct in the main. But people who have even learned enough "to pass" one of the examinations the author names—the Matriculation (London) or the Elementary Stage (South Kensington)—must surely be in a better condition than before, spite of the inane questions the author speaks of as being set.

The extent of the book is to the so-called non-metallic elements only, their preparation, reactions, &c., and questions, including arithmetical problems, follow each element treated of.

The plan is very complete, perhaps too complete, for very young students such as we have nowadays. For instance, under the heading of each element is given—(A) Symbol, (B) weight number (atomic weight), (C) preparation, with several methods *in extenso*, (D) properties, with further numerated subsections 1 to 6, &c. Even Greek letters are used for "planning out" a property of a substance, &c.

Although the author starts by telling us how he dislikes examinations, his little book is eminently meant to cram students up for them. It is evidently intended to be used as a class-book, so that the beginner will have the assistance of a teacher to make a beginning.

There are a few misprints, and the descriptions are obscure in places.

Why do people who write little books always begin with hydrogen? In this book we begin with hydrogen, valency, ice, water, steam, latent heat, ammonia, and then come to oxygen, which has been spoken of as if we knew all about it. We certainly think, with most German teachers, that it is most logical to commence with oxygen and nitrogen and the atmosphere. There is much less knowledge of other substances to be assumed.

Hand-book of Mosses, with an Account of their Structure, Classification, Geographical Distribution, and Habitats. By James E. Bagnall, A.L.S. (Swan Sonnenschein and Co., 1886.)

THIS little book is a popular, but on the whole accurate, account of the best-known British mosses. The chapter on development, usually the weakest part of hand-books of this kind, is better than usual. We must however call

attention to the confusion between "cuticle" and "epidermis" on p. 19, and to the unnecessarily bewildering description of the development of the spores on the following page.

The longest and also the best chapter is that on moss habitats, containing a very clear general description of the most important species, arranged according to the localities in which they are to be found. The following chapter, that on classification, is certainly not up to date, but perhaps the arrangement adopted is not intended for a natural one. The remaining sections, on distribution, cultivation, uses, and the preparation of specimens, are slight, but good as far as they go.

The book ought to be useful as an introduction to the systematic study of mosses.

D. H. S.

The Tourist's Guide to the Flora of the Alps. By Prof. K. W. v. Dalla-Torre. Translated and Edited by Alfred W. Bennett, M.A., B.Sc., F.L.S. (Swan Sonnenschein and Co., 1886.)

MR. BENNETT has introduced to English tourists a most convenient and useful Alpine flora. It is issued in a handy pocket-book form, and ought to be very popular with all travellers who take any interest in plants. The author had originally excluded the "commonest and most ubiquitous plants," but some even of these have been added by the translator, and all those natives of the Alpine districts which are not described in the flora proper will be found enumerated in an appendix.

Only two suggestions occur to us. Might not the often difficult work of identification be facilitated by the introduction of one or two analytical tables, such as those in Wünsche's "Schul-Flora von Deutschland?" They need not much increase the bulk of the book. And secondly, might it not be better, in a work intended for English tourists, and not for scientific men, to substitute English measures for those of the metric system? The latter ought by this time to be equally familiar with our own to educated people, but as a matter of fact we fear they are not so.

D. H. S.

Newton: His Friend: and His Niece. By the late Augustus De Morgan. Edited by his Wife and by his Pupil, Arthur Cowper Ranyard. (London: Elliot Stock, 1885.)

THE nucleus of the volume entitled as above was formed by an article written in 1858 for the *Companion to the British Almanac*. Its rejection brought to a close the remarkable series of Prof. De Morgan's contributions to that publication. The undivulged article, however, as years went on, grew by gradual accretions to the proportions of a book, now at last posthumously given to the world. Its primary object is to clear the character of Newton from the odious imputation of having countenanced immorality for the sake of personal advancement. This, in our opinion, has been satisfactorily attained. The researches here embodied afford strong grounds for the persuasion that there was no immorality to countenance. The sneer enshrined in No. 21 of Voltaire's "Lettres Philosophiques" (1765) thus at last loses its sting.

Catherine Barton, the "famous witty Miss Barton," as she was called in the *Gentleman's Magazine*, was the daughter of the Rev. Mr. Barton, by Hannah Smith, Newton's half-sister, and was born in 1680. Educated at the charge of her uncle, she came to keep house for him in London a year or two before 1700. Her beauty and brilliancy were the talk of the town, and won her the homage of men eminent for position and parts. She was amongst those whom Swift "loved best"; "j'ai conservé" Remond de Montmort wrote in 1716, "l'idée du monde la plus magnifique de son esprit et de sa beauté;" Charles Montague, Earl of Halifax, formed for her a devoted and life-long attach-